

moved across the ocean on a general northeasterly course to the Gulf of Alaska. On the 7th it caused whole gales locally near 40° N., 163° E., and on the 8th and 9th was the source of strong to whole gales over a wide extent in midocean. On the 10th the gale area was over the northeastern waters.

About the 10th the lower extension of a central Aleutian cyclone became detached from the principal storm center. It developed energy on the two following days in low latitudes, resulting in strong northeast gales near Midway Island on the 12th, and northwest winds of hurricane strength, encountered by the Dutch motorship *Kedoe*, to the west of Midway on the 11th and 12th. Thereafter it quickly dissipated.

The stormiest period of the month was the 23d to 26th, when the winds were strongest, within the approximate 10-degree square, 45° – 55° N., 140° – 150° W., where gales of force 10 to 11 were encountered during the 4 days. The storm abated on the 27th.

On the northern portion of the American coast the principal high winds of the month were a whole gale on the 1st near Vancouver Island, and fresh to strong gales on the 18th and the 22d to 26th off the Washington and Oregon coasts.

The accompanying storm table lists all the important gales of the month that space accommodates, but omits some of the numerous gales of force 8 which have been reported.

Monsoons and northers.—Owing to the highly developed state of the Asiatic anticyclones and their projection oceanward, the northeast monsoon was an important meteorological condition during more than half of January over the Japan, Yellow, and North China Seas.

In the Gulf of Tehuantepec less than the normal number of January days with northers occurred. Some Tehuantepec weather was reported, but the only gales of record in the gulf were one of force 9 on the 1st, and another of force 7 on the 5th.

Fog.—Fog increased somewhat in occurrence, both on the United States coast and in midocean, over that of December, 1932. It occurred on 6 days off the California coast; in midocean mostly from the 24th to 29th; and on a few scattered dates in other parts of the sea.

TROPICAL CYCLONE IN THE SOUTH PACIFIC OCEAN, JANUARY 3–4, 1933

A special report from the R. M. S. *Maunganui*, Cook Islands to Wellington, New Zealand, states that the ship was caught in a cyclone of hurricane intensity in latitude $22^{\circ} 17'$ S., longitude $160^{\circ} 52'$ W., or approximately 80 miles southwest of Rarotonga Island, on the night of January 3–4, 1933.

The vessel left Rarotonga at 5:20 p. m. of the 3d, with heavy rain, backing wind, and falling pressure. At 11 p. m. the wind was north-northeast, force 8, with seas making rapidly. At 11:55 p. m. the wind was from the northwest, force 12, and the ship hove to. At 12:30 a. m. of the 4th the corrected barometer read 969 mb. (28.62 inches). Shortly thereafter the wind moderated to west-southwest, 7, with rising barometer and clear sky overhead. It was followed by renewed hurricane velocities until 2 a. m., after which wind and sea began slowly to abate. Several hands on board received injuries during the storm, and much minor damage was sustained by the ship.—W. E. Hurd.

CLIMATOLOGICAL TABLES

DESCRIPTION OF TABLES AND CHARTS

Table 1 gives the data ordinarily needed for climatological studies for about 188 Weather Bureau stations making simultaneous observations at 8 a. m. and 8 p. m. daily, seventy-fifth meridian time, and for about 25 others making only one observation. The altitudes of the instruments above ground are also given.

Beginning with January 1, 1932, all wind movements and velocities published herein are corrected to true values by applying to the anemometer readings corrections determined by actual tests in wind tunnels and elsewhere.

Table 2 gives, for about 36 stations of the Canadian Meteorological Service, the means of pressure and temperature, total precipitation, depth of snowfall, and the respective departures from normal values except in the case of snowfall. The sea-level pressures have been computed according to the method described by Prof. F. H. Bigelow in the REVIEW of January, 1902, 30: 13–16.

CHART I.—Temperature departures.—This chart presents the departures of the monthly mean surface temperatures from the monthly normals. The shaded portions of the chart indicate areas of positive departures and unshaded portions indicate areas of negative departures. Generalized lines connect places having approximately equal departures of like sign. This chart of monthly surface temperature departures in the United States was first published in the MONTHLY WEATHER REVIEW for July, 1909, but smaller charts appear in W. B. Bulletin U for 1873 to June, 1909, inclusive.

CHART II.—Tracks of centers of ANTICYCLONES; and

CHART III.—Tracks of centers of CYCLONES. The Roman numerals show the chronological order of the

centers. The figures within the circles show the days of the month, the location indicated being that at 8 a. m., seventy-fifth meridian time. Within each circle is also an entry of the last three figures of (Chart II) the highest barometric reading, or (Chart III) the lowest reading reported at or near the center at that time, in both cases as reduced to sea level and standard gravity. The intermediate 8 p. m. locations are indicated by dots. The inset map of Chart II shows the departure of monthly mean pressure from normal and the inset of Chart III shows the change in mean pressure from the preceding month.

The use of a new base map for Charts II and III began with the January, 1930, issue.

CHART IV.—Percentage of clear sky between sunrise and sunset.—The average cloudiness at each regular Weather Bureau station is determined by numerous personal observations between sunrise and sunset. The difference between the observed cloudiness and 100 is assumed to represent the percentage of clear sky, and the values thus obtained are the basis of this chart. The chart does not relate to the night hours.

CHART V.—Total precipitation.—The scales of shading with appropriate lines show the distribution of the monthly precipitation according to reports from both regular and cooperative observers. The inset on this chart shows the departure of the monthly totals from the corresponding normals, as indicated by the reports from the regular stations.

CHART VI.—Isobars at sea level, average surface temperatures, and prevailing wind directions.—The pressures have been reduced to sea level and standard gravity by the method described by Prof. Frank H. Bigelow in the

REVIEW for January, 1902, 30: 13-16. The pressures have also been reduced to the mean of the 24 hours by the application of a suitable correction to the mean of 8 a. m. and 8 p. m. readings at stations taking two observations daily, and to the 8 a. m. or the 8 p. m. observation, respectively, at stations taking but a single observation.

The diurnal corrections so applied, except for stations established since 1901, will be found in the Annual Report of the Chief of the Weather Bureau, 1900-1901, volume 2, Table 27, pages 140-164.

The sea-level temperatures are now omitted and average surface temperatures substituted. The isotherms can not be drawn in such detail as might be desired, for data from only the regular Weather Bureau stations are used.

The prevailing wind directions are determined from hourly observations at almost all the stations. A few stations determine their prevailing directions from the daily or twice-daily observations only.

CHART VII.—*Total snowfall*.—This is based on the reports from regular and cooperative observers and shows the depth in inches of the snowfall during the month. In general, the depth is shown by lines connecting places of equal snowfall, but in special cases figures also are given. This chart is published only when the snowfall is sufficiently extensive to justify its preparation. The inset of this chart, when included, shows the depth of snow on the ground at or near the end of the month.

CHARTS VIII, IX, etc.—*North Atlantic Weather maps of particular days*.

CONDENSED CLIMATOLOGICAL SUMMARY

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Condensed climatological summary of temperature and precipitation by sections, January, 1933

(Compiled by Annie E. Small)

Section	Temperature								Precipitation							
	Section average	Departure from the normal	Monthly extremes						Section average	Departure from the normal	Greatest monthly		Least monthly		Amount	Amount
			Station	Highest	Date	Station	Lowest	Date			Station	Amount	Station	Amount		
	°F.	°F.		°F.			°F.		In.	In.		In.		In.		In.
Alabama	52.6	+6.3	Evergreen	81	20	Florence	18	1	3.17	-1.78	Clayton	8.14	Marion	1.87		
Arizona	39.0	-3.8	Granite Reef Dam	83	8	Alpine	-17	24	1.98	+1.82	Oracle	7.40	Tuba City	T		
Arkansas	48.8	+7.5	Warren	81	19	Marshall	11	1	3.66	-1.62	Blytheville	7.33	Mountain Home	1.65		
California	39.8	-4.4	San Bernardino (near)	88	9	Bridgeport	-22	30	6.42	+1.85	Dinkey Meadow	23.01	Greenland Ranch	1.10		
Colorado	25.1	+1.3	Two Buttes	75	24	Alamosa	-30	1	.53	-1.24	Cumbres	4.63	20 stations	.00		
Florida	62.7	-3.6	2 stations	88	18	2 stations	25	1	2.31	-1.48	Madison	6.79	Everglades	.07		
Georgia	53.6	+6.5	do	83	120	Clayton	14	2	3.59	-1.61	Meldrim	6.57	Augusta	1.86		
Idaho	24.0	+2	Orofino	58	2	Deadwood	-25	16	2.63	+1.54	Roland	12.31	Grand View	.12		
Illinois	38.6	+12.2	Duquoin	70	22	La Harpe	4	14	2.64	+1.33	Mt. Carmel	6.27	2 stations	.52		
Indiana	38.6	+10.2	Shoals	72	22	Laporte	5	1	3.17	+1.04	Salem	7.16	Albion	.84		
Iowa	32.5	+14.0	Thurman	62	8	Northwood	-10	14	.95	-1.12	Clinton	2.43	Inwood (near)	.18		
Kansas	39.3	+9.8	Garden City	72	21	Tribune	3	27	.25	-1.36	Pittsburg	1.20	9 stations	.00		
Kentucky	43.9	+8.1	Ashland	74	22	St. John	10	14	5.18	+1.78	Mt. Sterling	7.50	Cold Spring	3.49		
Louisiana	57.2	+5.7	2 stations	83	11	Robeline	20	1	3.41	-1.41	Port Eads	7.42	Bogalusa	.84		
Maryland-Delaware	41.0	+8.1	do	70	19	Oakland, Md	4	1	3.18	-1.05	Millsboro, Del	5.09	Keedysville, Md	1.96		
Michigan	29.5	+9.5	Monroe	65	22	Bessemer	-26	13	1.29	-1.59	Cassopolis	3.62	Bay City	.44		
Minnesota	17.5	+9.1	New Ulm	59	7	2 stations	-39	12	1.03	+1.29	Fosston	7.46	Pipestone	.02		
Mississippi	53.5	+6.5	2 stations	80	19	do	18	11	3.10	-1.92	Fruitland Park	5.94	Columbus	1.42		
Missouri	41.4	+10.9	Marble Hill	72	18	do	8	12	2.43	+1.39	Marble Hill	7.87	Tarkio	.32		
Montana	22.8	+3.2	Great Falls	63	9	Wisdom	-35	17	.90	+1.02	Heron	6.25	Lustre (near)	.02		
Nebraska	32.9	+11.4	McCook	73	3	Nenzel (near)	-9	17	.20	-1.35	Seward	1.18	11 stations	.00		
Nevada	27.7	-1.6	Clay City	75	15	3 stations	-18	15	1.76	+1.57	Kimberly	5.44	Thorne	.30		
New England	30.9	+8.2	Pittsfield, Mass.	65	15	Van Buren, Me.	-21	14	2.38	-1.01	Portland, Me.	5.40	Burlington, Vt.	.75		
New Jersey	38.5	+8.8	Elizabeth	67	23	Culvers Lake	2	1	2.39	-1.27	Port Norris	4.45	Elizabeth	1.38		
New Mexico	32.0	-1.7	4 stations	71	15	Dulce	-24	2	.46	-1.10	Cloudercroft	3.04	7 stations	.00		
New York	32.8	+9.6	2 stations	67	120	Lake Placid	-19	1	1.59	-1.32	Lyons Falls	3.21	Ithaca	.44		
North Carolina	48.1	+6.6	New Bern	80	21	Mt. Mitchell	6	9	2.88	-1.79	Mt. Mitchell	7.65	Charlotte	1.37		
North Dakota	11.8	+5.6	New England	53	24	Mott	-30	16	.80	+1.33	Hillsboro	1.79	Wishek	.11		
Ohio	37.7	+9.8	Middleport	73	22	2 stations	6	1	1.93	-1.04	Chilo	6.93	Lima	.70		
Oklahoma	46.8	+9.1	Poteau	78	19	Kenton	6	27	1.08	-1.41	Hugo	5.95	5 stations	T		
Oregon	30.8	-9	2 stations	68	18	Sand Creek	-23	17	4.83	+1.02	Tillamook	22.52	Hay Creek	.21		
Pennsylvania	37.0	+9.1	do	71	22	2 stations	-6	1	2.00	-1.25	Waynesburg	3.43	Lawrenceville	.54		
South Carolina	51.4	+5.5	Calhoun Falls	80	21	Long Creek	16	12	2.64	-1.92	Beaufort (near)	4.40	Darlington	1.07		
South Dakota	25.9	+10.5	Spearfish	63	28	Pollock	-33	17	.25	-1.34	Hardy Ranger Station	2.18	2 stations	.00		
Tennessee	46.2	+7.2	Savannah	76	11	Elkmont (2)	11	1	3.46	-1.27	Newbern	7.63	Charleston	1.64		
Texas	53.8	+5.6	Rio Grande	89	17	Romero	11	27	1.80	-1.02	Marshall	8.63	11 stations	.00		
Utah	22.6	-2.3	St. George	61	15	Castle Dale	-26	29	1.60	+1.32	Silver Lake	8.24	3 stations	.06		
Virginia	43.6	+7.8	Diamond Springs	78	23	2 stations	11	11	3.38	+1.15	Burkes Garden	5.48	Ivanhoe	1.92		
Washington	32.0	+2.5	3 stations	64	16	Stockdills Ranch	-12	19	6.44	+1.24	Wynoochee Oxbow	30.48	Wahluke	.34		
West Virginia	39.8	+7.6	Wardensville	79	19	Pickens	1	1	3.74	+1.13	Charleston	6.41	Upper Tract	1.15		
Wisconsin	25.1	+10.0	Viroqua	55	6	2 stations	-27	12	1.22	+1.03	Blair	3.18	P. K. Reservoir	.35		
Wyoming	22.0	+3.6	Sheridan	62	9	Eden	-27	31	.70	-1.20	Bechler River	11.41	Dull Center (near)	.00		
Alaska (December)	10.7	+1.3	Tree Point	52	4	Fort Yukon	-52	128	1.98	-1.09	View Cove	14.43	2 stations	.00		
Hawaii	69.4	+7	Mahukona	90	5	Kanalohuluhula	40	11	10.45	+1.30	Puhonua	45.60	Lanniupoko	.00		
Puerto Rico	72.9	-1	San German	98	4	Guineo Reservoir	42	31	2.61	-1.97	Rio Blanco	9.18	Yauco	.08		

1 Other dates also.